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PATENT ABSTRACTS OF JAPAN

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TOTTORI SANYO ELECTRIC CO LTD

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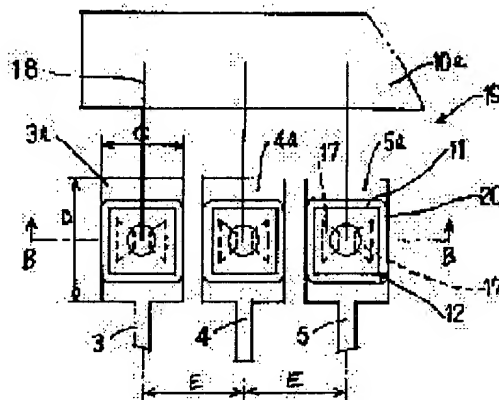
(72)Inventor : YOSHIURA MASAYASU

(54) DISPLAY DEVICE

(57)Abstract:

PURPOSE: To bring adjacent electrically conductive adhesives out of contact with each other and to secure adhesive strengths by forming partially punched patterns of plural electrodes on a substrate in the downward positions of light emitting diodes and filling them with the electrically conductive adhesives.

CONSTITUTION: At ends of electrically conductive patterns 3, 4, 5... formed on the surface of a substrate made of a glass epoxy resin, etc., electrodes 3a, 4a, 5a... 10a are formed at a distance and punched patterns 17 of one pair having nearly trapezoidal shapes are formed symmetrically around centers of electrodes 3a, 4a, 5a.... These punched patterns 17 are partially positioned in the downward positions of light emitting diodes 12 and electrode materials are not present in these parts. Then, electrically conductive adhesives 11 made of silver paste, etc., are provided to fill the punched patterns 17 and light emitting diodes 12 are fixed to the electrodes with pressure. Even though light emitting diodes 12 are mounted at high density, adjacent electrically conductive adhesives 11 can be prevented from coming into contact with each other by restraining electrically conductive adhesives 11 from spreading to the surroundings with the punched patterns 17.



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CLAIMS

[Claim(s)]

[Claim 1] It is the display with which it has two or more light emitting diodes prepared through the electroconductive glue on two or more electrodes which separated mutually on a substrate and its substrate and were prepared, and each electrode, and keeps being located partially [the aforementioned electrode] in the lower part of the aforementioned light emitting diode, a pattern is formed, and the aforementioned electroconductive glue is characterized by the thing [being prepared so that it may extract and a pattern may be buried].

[Claim 2] It is the display which is equipped with a substrate, two or more electrodes which separated mutually and were prepared on the substrate, two or more light emitting diodes prepared through the electroconductive glue on each electrode, and the insulating layer prepared on the aforementioned substrate so that the aforementioned electroconductive glue might be surrounded, and is characterized by the aforementioned insulating layer consisting of the quality of the material with bad wettability to the aforementioned electroconductive glue.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the display which has arranged two or more light emitting diodes on a substrate.

[0002]

[Description of the Prior Art] Conventionally, the display for display units is indicated by JP,56-17384,A, and it is explained according to the cross section of drawing 7 . On a substrate 41, an electrode 42 separates mutually, and is formed, light emitting diode 44 is laid through an electroconductive glue 43 on an electrode 42, and display 45 is constituted. thus, in the display 45 with which seven light emitting diodes 44 (three pieces are illustrated in drawing 7) were laid on the straight line, the structure of IC (integrated circuit device) which supplies the driver voltage to each light emitting diode 44 usually becomes easy -- as -- an anode -- it wires as common

[0003] That is, the common electrode (not shown) was wired through the metal thin line 46 in the anode electrode of light emitting diode 44, the cathode electrode was connected with each electrode 42, and the external power is connected with each electrode 42. And the film 47 of a camera is formed above display 45 through a cylindrical lens (not shown), a film 47 is moved in the direction which intersects perpendicularly with the space of drawing 7 , and each light emitting diode 44 is made to turn on alternatively. Consequently, six 7 dots long and 5 dots wide numbers are exposed by the film 47, and the display of a date like 940916 of them is attained at it.

[0004]

[Problem(s) to be Solved by the Invention] The number on a film 47 has so good that a dot pitch is small display quality in above-mentioned equipment. Then, this invention person manufactured the display whose dot pitch H which does not have trouble to a display quality target practically is 0.45mm. The width of face of 0.3mm and an electrode 42 of the width of face of light emitting diode 44 is 0.35mm in this display 45. However, electroconductive-glue 43 adjoining comrades contact and there is a fault which also turns on the non-wanted light emitting diode 44. A cause is because an electroconductive glue 43 spreads around and connects too hastily by G points. If the coverage of an electroconductive glue 43 is reduced in order to cancel this fault, the fault in which die bond intensity falls to and light emitting diode 44 exfoliates will arise.

[0005] As mentioned above, with conventional equipment, in order to have prevented contact of electroconductive glues and to have secured the intensity of die bond, 0.65mm or more fake colander was not obtained for a dot pitch H. Moreover, although using monolithic type light emitting diode is also considered in order to carry out high density assembly of the light emitting diode, since cost becomes high, it is not employable. Therefore, even if this invention mounts light emitting diode with high density in consideration of such a conventional fault (a dot pitch is small), an adjoining electroconductive glue does not contact and it offers the cheap display of cost which can secure die bond intensity.

[0006]

[Means for Solving the Problem] It has two or more electrodes which left the 1st this invention mutually on the substrate and the substrate, and were prepared, and two or more light emitting diodes prepared through the electroconductive glue on each electrode, in order to solve an above-mentioned technical problem, an electrode keeps being partially located in the lower part of light emitting diode, a pattern is formed, and an electroconductive glue is the thing prepared so that it may extract and a pattern may be buried.

[0007] And the 2nd this invention is equipped with a substrate, two or more electrodes which separated mutually and were prepared on the substrate, two or more light emitting diodes prepared through the electroconductive glue on each electrode, and the insulating layer prepared on the substrate so that an electroconductive glue might be surrounded, and wettability chooses an insulating layer from the bad quality of the material to an electroconductive glue.

[0008]

[Function] As mentioned above, by the 1st this invention, an electroconductive glue is prepared so that the electrode partially located in the lower part of light emitting diode may extract and a pattern may be buried. Therefore, it extracts, the flare to the circumference is inhibited with a pattern, and an electroconductive glue can prevent that the electroconductive glue which adjoins that the interval of the adjoining electrode is small contacts.

[0009] And the insulating layer which surrounds an electroconductive glue in the 2nd this invention has bad wettability to an electroconductive glue. Therefore, since an electroconductive glue is crawled by the insulating layer, the flare to the circumference is inhibited and it can prevent that an adjoining electroconductive glue contacts.

[0010]

[Example] The 1st example of this invention is explained according to drawing 1 or drawing 3 below. The A section detail drawing of drawing 1 and drawing 3 of the plan of the display which drawing 1 requires for this example, and drawing 2 are BB cross sections of drawing 2. In these drawings, a substrate 1 consists for example, of a glass epoxy resin, and, for length, 8mm and width are [1mm and thickness of a size] 1mm. It attaches in a substrate 1 and two holes 2 of business are formed.

[0011] Eight electric conduction patterns 3-10 are formed on the front face of a substrate 1, at the end of each electric conduction patterns 3-10, it separates mutually, Electrodes 3a-10a are formed, and terminal areas 3b-10b are formed in the other end. The electric conduction patterns 3-10 consist of copper foil etc., the deposit to which Electrodes 3a-10a consist of a nickel layer and a gold layer on the copper foil is given, and the whole thickness is 30-50 micrometers. For example, the width C is [about 0.35mm and Length D of the size of Electrodes 3a-9a] about 0.5mm, and the pitch E is about 0.45mm.

[0012] The electroconductive glue 11 consisted for example, of a silver paste etc., and has fixed on electrode 3a - 9a. Installation fixing of the light emitting diode 12 is carried out on the electroconductive glue 11. An electroconductive glue 11 is specifically arranged on heated electrode 3a - 9a, and it has become paste-like. And it has fixed by arranging and pressurizing the light emitting diode 12 held by the chip mounter (not shown) on the paste-like electroconductive glue 11.

[0013] It consists of a gallium phosphide, and the laminating of the N type layer 14, the P type layer 15, and the surface electrode 16 is carried out on the rear-face electrode 13, for example, light emitting diode 12 emits light in the umber color which is about 585nm. The rear-face electrode 13 may consist of gold with a thickness of several micrometers, and may be formed in the whole rear face of the N type layer 14, or may be formed in the shape of [of a bee] a nest. Moreover, the N type layer 14 may carry out the laminating of two or more N type epitaxial layers from which high impurity concentration differs. Thus, the constituted light emitting diode 12 is an abbreviation cube whose one side is about 0.3mm.

[0014] A characteristic thing is that keep being partially located in the lower part of light emitting diode, and the pattern 17 is formed in Electrodes 3a-9a in this example. Namely, by extracting, if a pattern 17 is seen from a flat surface like drawing 2, the thing of one pair of abbreviation trapezoidal shapes is symmetrically extracted in the center of Electrodes 3a-9a, and the material of an electrode does not exist in this portion.

[0015] And the electroconductive glue 11 is formed so that it may extract and a pattern 17 may be buried. Seven metal thin lines 18 are wired between the surface electrode 16 of each light emitting diode 12, and electrode 10a. The display 19 of this example is constituted by these members.

[0016] Next, manufacture of display 19 is described. As mentioned above, light emitting diode 12 is pressurized on the electroconductive glue 11 of the shape of a heated paste, and an electroconductive glue 11 can be extended around. However, it extracts and an electroconductive glue 11 is poured in into a pattern 17, and the force which was prepared in Electrodes 3a-9a and which a **** extends is extracted, and is inhibited by the level difference of a pattern 17.

[0017] Consequently, the circumference portion 20 of an electroconductive glue 11 remains in the range on electrode 3a - 9a, and hanging down to a substrate 1 and falling is prevented. Therefore, electroconductive-glue 11 comrades which the flare to the circumference is inhibited, and the interval E of the adjoining electrode compares an electroconductive glue 11, and adjoin 0.45mm as it is small do not contact. Moreover, since it extracts, ***** of an electroconductive glue 11 is made with a pattern 17 and the coverage of an electroconductive glue 11 is maintainable in sufficient amount, the intensity of die bond is also secured.

[0018] Next, operation of display 19 is described. As display 19 is shown in drawing 3, the film 21 of a camera is formed in the upper part through the cylindrical lens for condensing (not shown). By the driver voltage from IC (integrated circuit device) connected to terminal areas 3b-10b, seven light emitting diodes 12 (three pieces are illustrated in drawing 3) are turned on alternatively. Simultaneously with the lighting, a film 21 moves in the direction which intersects perpendicularly with space, and six 7 dots long and 5 dots wide numbers are exposed on a film 21, for example, a date like 940917 is recorded. Since each 7 dots long pitch is as small as 0.45mm in this digital display, the thing of the grade in which the display quality on a film 21 does not have trouble practically is obtained.

[0019] Furthermore, the 2nd example of this invention from which it extracts and the configuration of a pattern differs is explained according to drawing 4 and drawing 5. The important section plan of the display which drawing 4 requires for this example, and drawing 5 are FF cross sections of drawing 4. In these drawings, if it extracts and a pattern 22 is seen from a flat surface, the 1 to 3 square-shape-like thing extracts symmetrically the center of Electrodes 23a-25a. Thus, it extracts, and the pattern 22 is formed so that it may be partially located in the lower part of light emitting diode 12. And the electroconductive glue 26 is formed so that it may extract and a pattern 22 may be buried.

[0020] Light emitting diode 12 is pressurized on the paste-like electroconductive glue 26, and an electroconductive glue 26 is [in / manufacture of this display 27] extensible. However, it extracts and an electroconductive glue 26 is poured in into a pattern 22, and the force which was prepared in Electrodes 23a-25a and which a **** extends is extracted, and is inhibited by the level difference of a pattern 22. As a result, as for the circumference portion 28 of an electroconductive glue 26, the flare to the circumference is inhibited.

[0021] Although cost becomes high rather than the 1st example or the 2nd example at the last, the flare deterrent beside an electroconductive glue explains the 3rd large example according to drawing 6. Drawing 6 is the important section cross section of the display concerning this example. The electrodes 30, 31, and 32 which consist of copper foil with a thickness of 30-50 micrometers etc. are formed in this drawing 6 on the substrate 29 which consists of a glass epoxy resin etc. Light emitting diode 12 has fixed through the electroconductive glue 33 which consists of a silver paste on each electrodes 30 and 31 and 32.

[0022] An insulating layer 34 surrounds an electroconductive glue 33, and it is formed on the substrate 29 so that the crevice

between electrodes 30, 31, and 32 may be filled. The thickness of an insulating layer 34 is equal to the thickness of electrodes 30, 31, and 32, or being formed more thickly than it is desirable. The photosensitive resist (the poly **** leather acid system photoresist, a cyclized-rubber system photoresist, or quinone diaza id system photoresist) in which the insulating layer 34 was chosen as from the quality of the material with bad wettability to electroconductive glues 33 (silver paste etc.), for example, the epoxy resin impalpable powder of a weight ratio was mixed 2 to 10% is used.

[0023] Light emitting diode 12 is pressurized on the paste-like electroconductive glue 33, and an electroconductive glue 33 is [in / manufacture of this display 35] extensible. However, the insulating layer 34 formed so that an electroconductive glue 33 might be surrounded has bad wettability to an electroconductive glue 33. Therefore, since the circumference portion 36 of an electroconductive glue 33 is crawled by the insulating layer 34, the flare to the circumference is inhibited and it can prevent that electroconductive-glue 33 adjoining comrades contact.

[0024]

[Effect of the Invention] As mentioned above, by the 1st this invention, an electroconductive glue is prepared so that the electrode partially located in the lower part of light emitting diode may extract and a pattern may be buried. Therefore, it extracts, the flare to the circumference is inhibited with a pattern, and an electroconductive glue can prevent that the electroconductive glue which adjoins that the interval of the adjoining electrode is small contacts.

[0025] Moreover, since it extracts, ***** of an electroconductive glue is made with a pattern and the coverage of an electroconductive glue can also maintain sufficient amount, the intensity of die bond is also secured. Furthermore, compared with the former, since this invention is extracted to an electrode and prepares a pattern, while the same has been almost said of the cost, it can mount light emitting diode in high density (dot pitch 0.45mm).

[0026] And the insulating layer which surrounds an electroconductive glue in the 2nd this invention has bad wettability to an electroconductive glue. Therefore, since an electroconductive glue is crawled by the insulating layer, the flare to the circumference is inhibited and it can prevent that an adjoining electroconductive glue contacts.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] this invention relates to the display which has arranged two or more light emitting diodes on a substrate.

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PRIOR ART

[Description of the Prior Art] Conventionally, the display for display units is indicated by JP,56-17384,A, and it is explained according to the cross section of drawing 7 . On a substrate 41, an electrode 42 separates mutually, and is formed, light emitting diode 44 is laid through an electroconductive glue 43 on an electrode 42, and display 45 is constituted. thus, in the display 45 with which seven light emitting diodes 44 (three pieces are illustrated in drawing 7) were laid on the straight line, the structure of IC (integrated circuit device) which supplies the driver voltage to each light emitting diode 44 usually becomes easy -- as -- an anode -- it wires as common

[0003] That is, the common electrode (not shown) was wired through the metal thin line 46 in the anode electrode of light emitting diode 44, the cathode electrode was connected with each electrode 42, and the external power is connected with each electrode 42. And the film 47 of a camera is formed above display 45 through a cylindrical lens (not shown), a film 47 is moved in the direction which intersects perpendicularly with the space of drawing 7 , and each light emitting diode 44 is made to turn on alternatively. Consequently, six 7 dots long and 5 dots wide numbers are exposed by the film 47, and the display of a date like 940916 of them is attained at it.

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, by the 1st this invention, an electroconductive glue is prepared so that the electrode partially located in the lower part of light emitting diode may extract and a pattern may be buried. Therefore, it extracts, the flare to the circumference is inhibited with a pattern, and an electroconductive glue can prevent that the electroconductive glue which adjoins that the interval of the adjoining electrode is small contacts.

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[0026] And the insulating layer which surrounds an electroconductive glue in the 2nd this invention has bad wettability to an electroconductive glue. Therefore, since an electroconductive glue is crawled by the insulating layer, the flare to the circumference is inhibited and it can prevent that an adjoining electroconductive glue contacts.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The number on a film 47 has so good that a dot pitch is small display quality in above-mentioned equipment. Then, this invention person manufactured the display whose dot pitch H which does not have trouble to a display quality target practically is 0.45mm. The width of face of 0.3mm and an electrode 42 of the width of face of light emitting diode 44 is 0.35mm in this display 45. However, electroconductive-glue 43 adjoining comrades contact and there is a fault which also turns on the non-wanted light emitting diode 44. A cause is because an electroconductive glue 43 spreads around and connects too hastily by G points. If the coverage of an electroconductive glue 43 is reduced in order to cancel this fault, the fault in which die bond intensity falls to and light emitting diode 44 exfoliates will arise.

[0005] As mentioned above, with conventional equipment, in order to have prevented contact of electroconductive glues and to have secured the intensity of die bond, 0.65mm or more fake colander was not obtained for a dot pitch H. Moreover, although using monolithic type light emitting diode is also considered in order to carry out high density assembly of the light emitting diode, since cost becomes high, it is not employable. Therefore, even if this invention mounts light emitting diode with high density in consideration of such a conventional fault (a dot pitch is small), an adjoining electroconductive glue does not contact and it offers the cheap display of cost which can secure die bond intensity.

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MEANS

[Means for Solving the Problem] It has two or more electrodes which left the 1st this invention mutually on the substrate and the substrate, and were prepared, and two or more light emitting diodes prepared through the electroconductive glue on each electrode, in order to solve an above-mentioned technical problem, an electrode keeps being partially located in the lower part of light emitting diode, a pattern is formed, and an electroconductive glue is the thing prepared so that it may extract and a pattern may be buried.

[0007] And the 2nd this invention is equipped with a substrate, two or more electrodes which separated mutually and were prepared on the substrate, two or more light emitting diodes prepared through the electroconductive glue on each electrode, and the insulating layer prepared on the substrate so that an electroconductive glue might be surrounded, and wettability chooses an insulating layer from the bad quality of the material to an electroconductive glue.

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OPERATION

[Function] As mentioned above, by the 1st this invention, an electroconductive glue is prepared so that the electrode partially located in the lower part of light emitting diode may extract and a pattern may be buried. Therefore, it extracts, the flare to the circumference is inhibited with a pattern, and an electroconductive glue can prevent that the electroconductive glue which adjoins that the interval of the adjoining electrode is small contacts.

[0009] And the insulating layer which surrounds an electroconductive glue in the 2nd this invention has bad wettability to an electroconductive glue. Therefore, since an electroconductive glue is crawled by the insulating layer, the flare to the circumference is inhibited and it can prevent that an adjoining electroconductive glue contacts.

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EXAMPLE

[Example] The 1st example of this invention is explained according to drawing 1 or drawing 3 below. The A section detail drawing of drawing 1 and drawing 3 of the plan of the display which drawing 1 requires for this example, and drawing 2 are BB cross sections of drawing 2. In these drawings, a substrate 1 consists for example, of a glass epoxy resin, and, for length, 8mm and width are [1mm and thickness of a size] 1mm. It attaches in a substrate 1 and two holes 2 of business are formed.

[0011] Eight electric conduction patterns 3-10 are formed on the front face of a substrate 1, at the end of each electric conduction patterns 3-10, it separates mutually, Electrodes 3a-10a are formed, and terminal areas 3b-10b are formed in the other end. The electric conduction patterns 3-10 consist of copper foil etc., the deposit to which Electrodes 3a-10a consist of a nickel layer and a gold layer on the copper foil is given, and the whole thickness is 30-50 micrometers. For example, the width C is [about 0.35mm and Length D of the size of Electrodes 3a-9a] about 0.5mm, and the pitch E is about 0.45mm.

[0012] The electroconductive glue 11 consisted for example, of a silver paste etc., and has fixed on electrode 3a - 9a. Installation fixing of the light emitting diode 12 is carried out on the electroconductive glue 11. An electroconductive glue 11 is specifically arranged on heated electrode 3a - 9a, and it has become paste-like. And it has fixed by arranging and pressurizing the light emitting diode 12 held by the chip mounter (not shown) on the paste-like electroconductive glue 11.

[0013] It consists of a gallium phosphide, and the laminating of the N type layer 14, the P type layer 15, and the surface electrode 16 is carried out on the rear-face electrode 13, for example, light emitting diode 12 emits light in the umber color which is about 585nm. The rear-face electrode 13 may consist of gold with a thickness of several micrometers, and may be formed in the whole rear face of the N type layer 14, or may be formed in the shape of [of a bee] a nest. Moreover, the N type layer 14 may carry out the laminating of two or more N type epitaxial layers from which high impurity concentration differs. Thus, the constituted light emitting diode 12 is an abbreviation cube whose one side is about 0.3mm.

[0014] A characteristic thing is that keep being partially located in the lower part of light emitting diode, and the pattern 17 is formed in Electrodes 3a-9a in this example. Namely, by extracting, if a pattern 17 is seen from a flat surface like drawing 2, the thing of one pair of abbreviation trapezoidal shapes is symmetrically extracted in the center of Electrodes 3a-9a, and the material of an electrode does not exist in this portion.

[0015] And the electroconductive glue 11 is formed so that it may extract and a pattern 17 may be buried. Seven metal thin lines 18 are wired between the surface electrode 16 of each light emitting diode 12, and electrode 10a. The display 19 of this example is constituted by these members.

[0016] Next, manufacture of display 19 is described. As mentioned above, light emitting diode 12 is pressurized on the electroconductive glue 11 of the shape of a heated paste, and an electroconductive glue 11 can be extended around. However, it extracts and an electroconductive glue 11 is poured in into a pattern 17, and the force which was prepared in Electrodes 3a-9a and which a **** extends is extracted, and is inhibited by the level difference of a pattern 17.

[0017] Consequently, the circumference portion 20 of an electroconductive glue 11 remains in the range on electrode 3a - 9a, and hanging down to a substrate 1 and falling is prevented. Therefore, electroconductive-glue 11 comrades which the flare to the circumference is inhibited, and the interval E of the adjoining electrode compares an electroconductive glue 11, and adjoin 0.45mm as it is small do not contact. Moreover, since it extracts, ***** of an electroconductive glue 11 is made with a pattern 17 and the coverage of an electroconductive glue 11 is maintainable in sufficient amount, the intensity of die bond is also secured.

[0018] Next, operation of display 19 is described. As display 19 is shown in drawing 3, the film 21 of a camera is formed in the upper part through the cylindrical lens for condensing (not shown). By the driver voltage from IC (integrated circuit device) connected to terminal areas 3b-10b, seven light emitting diodes 12 (three pieces are illustrated in drawing 3) are turned on alternatively. Simultaneously with the lighting, a film 21 moves in the direction which intersects perpendicularly with space, and six 7 dots long and 5 dots wide numbers are exposed on a film 21, for example, a date like 940917 is recorded. Since each 7 dots long pitch is as small as 0.45mm in this digital display, the thing of the grade in which the display quality on a film 21 does not have trouble practically is obtained.

[0019] Furthermore, the 2nd example of this invention from which it extracts and the configuration of a pattern differs is explained according to drawing 4 and drawing 5. The important section plan of the display which drawing 4 requires for this example, and drawing 5 are FF cross sections of drawing 4. In these drawings, if it extracts and a pattern 22 is seen from a flat surface, the 1 to 3 square-shape-like thing extracts symmetrically the center of Electrodes 23a-25a. Thus, it extracts, and the pattern 22 is formed so that it may be partially located in the lower part of light emitting diode 12. And the electroconductive glue 26 is formed so that it may extract and a pattern 22 may be buried.

[0020] Light emitting diode 12 is pressurized on the paste-like electroconductive glue 26, and an electroconductive glue 26 is [in / manufacture of this display 27] extensible. However, it extracts and an electroconductive glue 26 is poured in into a pattern 22, and the force which was prepared in Electrodes 23a-25a and which a **** extends is extracted, and is inhibited by the level difference of a pattern 22. As a result, as for the circumference portion 28 of an electroconductive glue 26, the flare to the circumference is inhibited.

[0021] Although cost becomes high rather than the 1st example or the 2nd example at the last, the flare deterrent beside an electroconductive glue explains the 3rd large example according to drawing 6. Drawing 6 is the important section cross section of the display concerning this example. The electrodes 30, 31, and 32 which consist of copper foil with a thickness of 30-50 micrometers etc. are formed in this drawing 6 on the substrate 29 which consists of a glass epoxy resin etc. Light emitting diode 12 has fixed through the electroconductive glue 33 which consists of a silver paste on each electrodes 30 and 31 and 32.

[0022] An insulating layer 34 surrounds an electroconductive glue 33, and it is formed on the substrate 29 so that the crevice between electrodes 30, 31, and 32 may be filled. The thickness of an insulating layer 34 is equal to the thickness of electrodes 30, 31, and 32, or being formed more thickly than it is desirable. The photosensitive resist (the poly **** leather acid system photoresist, a cyclized-rubber system photoresist, or quinone diaza id system photoresist) in which the insulating layer 34 was chosen as from the quality of the material with bad wettability to electroconductive glues 33 (silver paste etc.), for example, the epoxy resin impalpable powder of a weight ratio was mixed 2 to 10% is used.

[0023] Light emitting diode 12 is pressurized on the paste-like electroconductive glue 33, and an electroconductive glue 33 is [in / manufacture of this display 35] extensible. However, the insulating layer 34 formed so that an electroconductive glue 33 might be surrounded has bad wettability to an electroconductive glue 33. Therefore, since the circumference portion 36 of an electroconductive glue 33 is crawled by the insulating layer 34, the flare to the circumference is inhibited and it can prevent that electroconductive-glue 33 adjoining comrades contact.

[Translation done.]

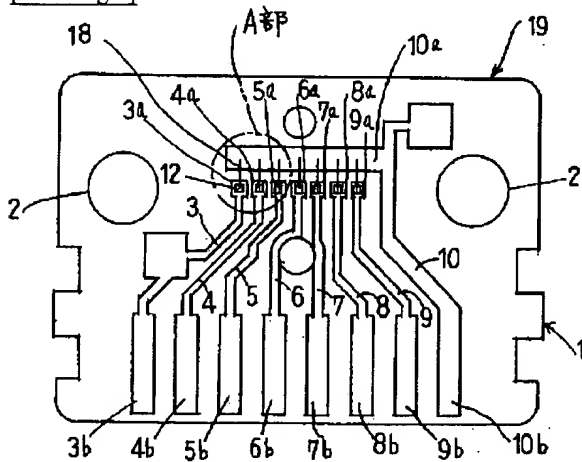
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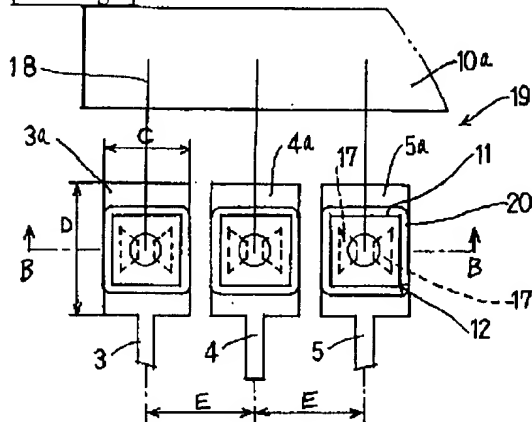
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DRAWINGS

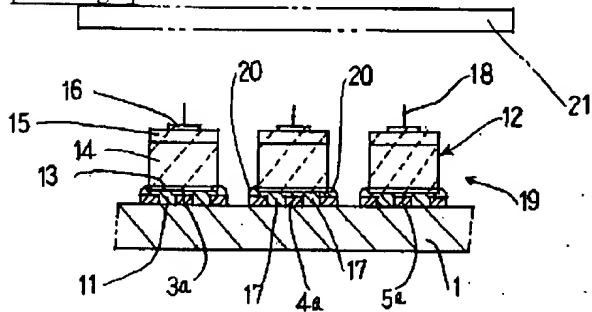
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Drawing 5]

This diagram shows a cross-sectional view of a multi-layered structure. A base layer 41 is shown with diagonal hatching. On top of this base, there are three identical units. Each unit consists of a bottom layer 42, a middle layer 43, and a top layer 44. The middle layer 43 has a dashed line indicating a boundary or interface. The top layer 44 is labeled 46. The units are separated by gaps, and the distance between the centers of the units is labeled H. A layer 45 is shown between the base 41 and the units. A layer 47 is shown above the units, with a dashed line indicating a boundary or interface.

[Translation done.]

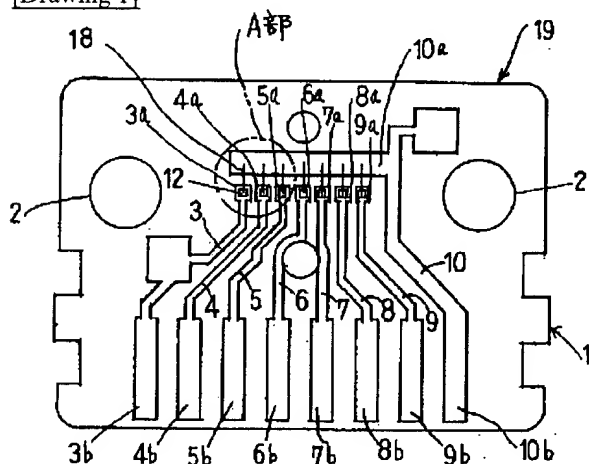
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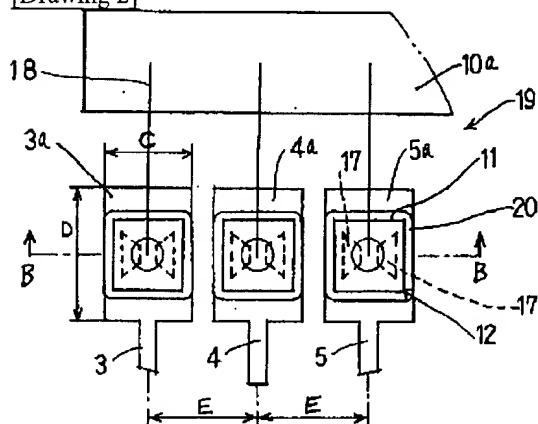
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DRAWINGS

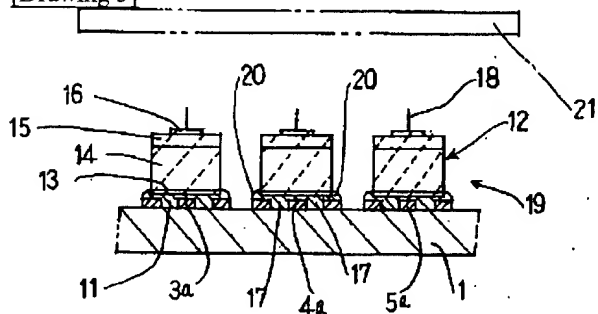
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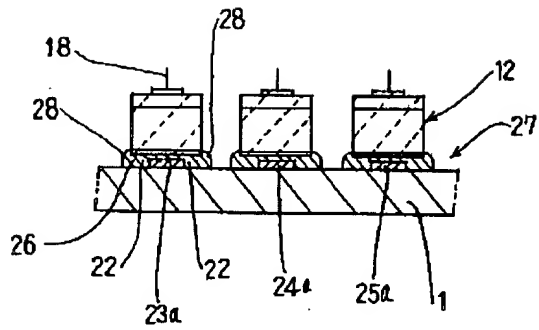
[Drawing 2]



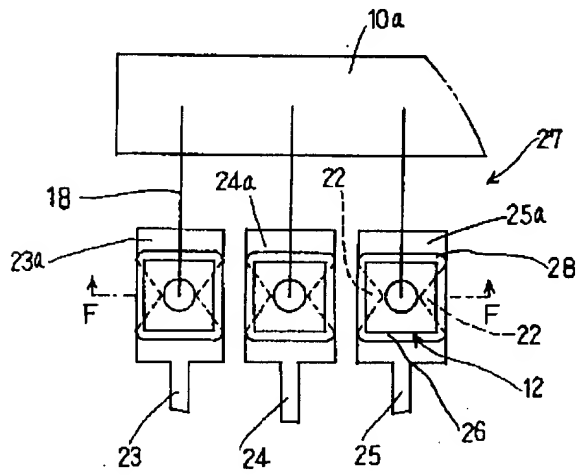
[Drawing 3]



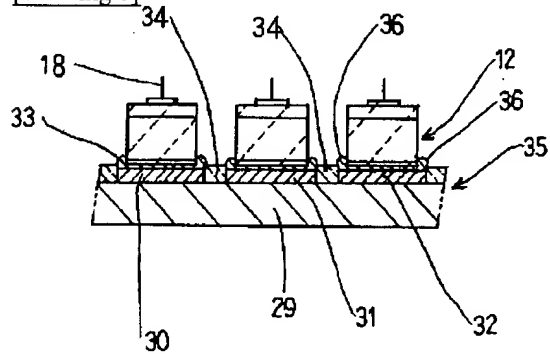
[Drawing 5]



[Drawing 4]



[Drawing 6]



[Drawing 7]

